

# Chronic disease management: a Singapore perspective

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The scope for chronic disease management programmes in Asian countries is tremendous. Rapidly ageing populations, demographic and epidemiological transitions, and changing disease profiles have prompted reviews of healthcare delivery across Asia. This paper provides a brief description of disease management approaches used for chronic illnesses in Singapore and shows that disease management can be successfully implemented in systems very different from that in the United States, where it originated.

## Need for chronic disease management

Chronic diseases have now overtaken infectious diseases as the main cause of mortality and morbidity in developed countries—as well as contributing to escalating healthcare costs. In most developed countries the dual problem of a rising prevalence of chronic disease and escalating costs has caused healthcare policy-makers to consider innovative approaches to containing costs and improving the quality of care. An increasing number of reports propose a more holistic and integrated approach for patients with chronic diseases—disease management.<sup>1-8</sup> This approach was first described by the Boston Consulting Group in 1993 and has been gaining popularity in managed care organisations in the United States.<sup>4-6</sup>

Most Asian healthcare systems combine state run and financed facilities with private providers. Managed care on a large scale does not exist. Most doctors in the public sector are paid fixed salaries. Copayments for medical fees are increasingly common, but this varies between countries. Despite the apparent heterogeneity of healthcare delivery and financing in Asia, there is a move towards the ideal of patient centred care, integration, and seamless care delivery. There is also an increasing emphasis on health promotion and disease prevention.

## Singapore's healthcare system

Singapore has a multiethnic population of about 4 million. Its standard of health is high: infant mortality is low (3 per 1000 live births) and life expectancy high (78 years). Singapore's population is relatively young today, but this will change over the next 20 to 30 years. In 1999, 7% of the population was aged 65 years or more; in 2030, 20% will be.<sup>9</sup> National healthcare expenditure is about 3% of gross domestic product,<sup>10</sup> low by international standards in developed countries, but it is expected to increase because of the ageing population and the burden of chronic illnesses.

Singapore's healthcare delivery system is a dual one—public and private: 80% of inpatient care is provided in public hospitals, while 80% of primary health care is provided by independently employed family physicians. A principal feature of the healthcare philosophy is that of individual responsibility for health and the need for copayment for services provided.

## Summary points

Asian countries have generally not yet tackled the issue of chronic disease management despite their recent epidemiological and demographic changes

Chronic disease management provides an approach that would enable healthcare systems in Asia to take a more holistic view of the care of patients with chronic illnesses

The literature on disease management might confuse Asian healthcare professionals because most comes from the context of managed care in the United States

The approach needs to be adapted to run within a state run and funded healthcare system; the experience of Singapore shows that this is possible

In the mid-1980s the government organised public hospitals into autonomous organisations to instill financial discipline and devolve operational autonomy. Today all public healthcare institutions are governed by two integrated networks—the Eastern cluster (Singapore Health Services) and the Western cluster (National Healthcare Group). The idea behind clustering was to forge vertical and horizontal integration between hospitals and primary healthcare facilities.

All hospitals in Singapore have computer based patient information systems, with computerised billing and pharmacy systems. Laboratory and radiology systems are being automated. While these “back end” systems are being integrated, much has yet to be done about the front end (patient care).

Primary healthcare centres, or polyclinics, are run by teams of (salaried) general practitioners, nurses, case managers, and therapists. The polyclinics are distinct from private general practitioners, who generally do not have other health staff working with them. The establishment of the clusters has provided a setting in which disease management could be readily implemented.

## Framework for chronic disease management in Singapore

Chronic diseases present different challenges from infectious diseases. They are characterised by readmissions for exacerbations of disease or complications, the need for long term follow up and medication, and the need for multidisciplinary clinical management. Discrete healthcare providers often duplicate laboratory and radiological investigations, especially if medical records are not shared. Traditionally there has been a lack of coordination among providers, and patient education is sporadic, unplanned, and uncoordinated. In view of this healthcare providers have searched for



A box with  
definitions of  
chronic disease  
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ways of facilitating patient care planning and integration of services.

Many different elements have been included under the umbrella of disease management, but in Singapore we see disease management as covering programmes that provide a systematic and comprehensive approach towards improving the holistic management of patients with chronic illnesses. This approach involves improving coordination care and controlling costs through integrating services across the entire range of healthcare services. It also includes applying tools (such as clinical information systems, clinical guidelines, and pathways) designed for the population in question. The Disease Management Association of America has a more formal definition, shown in the box on the *BMJ*'s website.

A multipronged disease management approach has been adopted, consisting of patient and family education, promotion of self management, clinical care process changes, use of various clinical tools and communication plans between caregiver and patient, feedback on patient outcomes, and an information technology infrastructure to support these activities. The framework aims to identify the chronic disease and define the target population; organise a multidisciplinary team; define the core components, treatment protocols, and evaluation methods; and measure the outcomes and aim for continuous quality improvement.

*Identify the chronic disease and define the target population*—Conditions appropriate for a disease management programme have:

- High prevalence
- High cost (charges per episode, high drug use, etc)
- High variability in practice patterns
- Poor clinical outcomes or a high risk of negative outcomes
- Inefficient delivery systems
- Potential for changes in patients' lifestyle to improve outcomes
- Availability of clinical and other expertise to develop the programme.

*Organise a multidisciplinary team*—The importance of a multidisciplinary team in developing and implementing a disease management programme cannot be overemphasised.<sup>11–13</sup> The team should include doctors, nurses, pharmacists, therapists, case managers, and administrators, and it is important to appoint a "clinician champion" to lead the team. As well as defining the goals of the programme and deciding what needs to be done, how it should be done, who would do it, and how much it would cost, the team must also anticipate the barriers to change. The same team should also evaluate the success of the programme on the basis of agreed performance and outcome indicators. Having clinician leaders and providing them with accountability and resources is crucial to getting their ownership and support for the programme.<sup>14</sup>

*Define the core components, treatment protocols, and evaluation methods*—The core components might include patient education, prevention measures, screening for complications, monitoring of compliance and clinical outcomes, behaviour modification, and environmental interventions. The Ministry of Health has started to develop and disseminate evidence based national clinical guidelines to all doctors. Dissemina-

### Elements of a chronic disease management programme

Clinical practice guidelines and clinical pathways  
Responsive and accessible patient information systems  
Methods for continuous quality improvement and clinical audits  
Resource management techniques and systems  
Access to specialty care management  
Emergency room management for specific chronic conditions  
Case management  
Patient education and counselling  
Telephone monitoring and tracking systems  
Community based opportunistic health screening  
National disease registries

tion alone will not, however, change practice. What is needed is a structured approach to incorporating these guidelines into everyday use. To do this, we found a protocol driven clinical pathway useful. The pathways incorporate clinical documentation and time based interventions and focus the team on coordinating care across different settings. Pathways in disease management programmes span the continuum from acute care to chronic ambulatory care and provide different care providers with the necessary linkages to coordinate clinical management and monitoring of outcomes.

*Measure outcomes and aim for continuous quality improvement*—It is essential to measure baseline outcomes before beginning disease management interventions to assess their effectiveness. Measured outcomes should include a mixture of clinical, humanistic, and financial outcomes.

### Elements of the programme

The prerequisites for a disease management programme are:

- An integrated healthcare delivery system capable of coordinating healthcare
- A comprehensive knowledge base on prevention, diagnosis, treatment, and palliation of chronic diseases

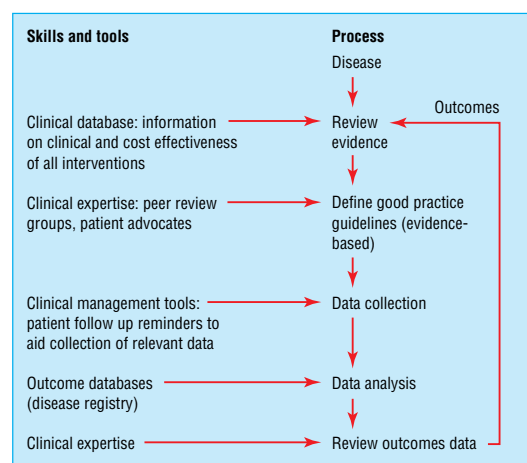


Fig 1 Skills and tools for disease management

- Sophisticated clinical and administrative information systems
- Continuous quality improvement systems
- Support for the programme from top management.

The disease management approach adopted in Singapore consists of a wide variety of tools and measures (see box and fig 1).

*Clinical practice guidelines and clinical pathways, shared across institutions*—Clinicians from hospitals and polyclinics meet to develop the clinical guidelines and pathways. This had not been done before disease management was adopted. Through such discussions multidisciplinary care teams gained a much better understanding of the entire care process, and members considered this a real benefit. Figure 2 illustrates an outline of a disease management plan for patients with newly diagnosed non-insulin dependent diabetes mellitus.

*Responsive and accessible patient information systems*, allowing providers to share parts of patients' medical records. Initially the inpatient discharge summary form was made electronic and the information made transferable across different providers. In future a clinical information system, shared between all hospitals and polyclinics, would enable more comprehensive and timely sharing of patient information.

*Methods for continuous quality improvement and clinical audits*—Each hospital has been using the same framework for quality improvement, evaluating both process and outcome measures. Specialty and disease specific clinical quality indicators have also been adopted from the Australian Council of Healthcare Standards. Examples include readmission rates for people with asthma, door to needle time for patients

admitted for acute myocardial infarction, deep vein thrombosis after hip surgery, and glycated haemoglobin levels in diabetic patients. The multidisciplinary disease management teams are provided with regular data on clinical indicators to foster a sense of ownership of the process and accountability for the outcomes. The data are presented and managed in a non-punitive manner, to encourage peer review and audit.

*Resource management techniques and systems*—Drug utilisation and prescription patterns are being monitored across clinical departments. A pharmacy and therapeutics committee provides recommendations on specific drugs to be used in hospitals and polyclinics. This prevents expensive drugs being liberally prescribed without consideration of the costs.

*Access to specialty care management*—Standard agreed criteria for referrals (urgent and non-urgent) have been developed for specific conditions.

*Emergency room management for specific chronic conditions*—For example, protocols for exacerbations of chronic asthma have been developed.

*Case management*—Case managers have been recruited and trained. These professionals are critical in developing clinical pathways and performing discharge planning and utilisation review.

*Patient education and counselling*, using shared methods and techniques. Patient adherence and self management are key components of any chronic disease management programme. Again, case managers are critical in helping patients adhere to treatment plans and modify their behaviour.

*Telephone monitoring and tracking systems* (outpatient attendance reminders, etc).

*Community based opportunistic health screening* and risk stratification programmes for early detection of people with risk factors for developing chronic diseases.

*National disease registries*, established by the Ministry of Health, hold relevant patient information to enable healthcare planners and professionals to evaluate the quality of care provided and observe trends in utilisation and outcomes. The registries will also enable quality comparisons between hospitals and research into chronic disease management. The ministry has plans to build national registries for stroke, cancer, diabetes mellitus, and chronic renal failure.

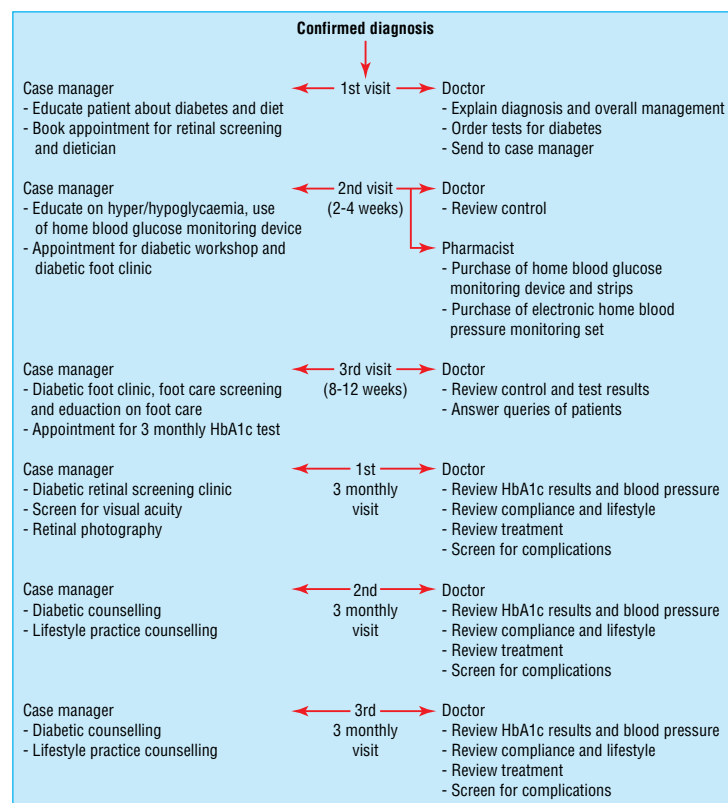


Fig 2 Management protocol for non-insulin dependent diabetes, first year

## Potential obstacles

Little understanding about disease management currently exists among healthcare professionals as this is a new approach. The peer reviewed literature does not contain many evaluations of disease management programmes, and the concept has yet to penetrate most Asian countries. Healthcare providers should therefore send their clinicians to courses and conferences which emphasise quality of care issues and how to deliver a cost effective service.

Simply disseminating guidelines has little effect on provider and patient behaviour. The Ministry of Health has taken up the challenge of developing national clinical guidelines, but providers also need to give doctors incentives to comply and develop systems to audit the care provided.



The traditional care delivery system tends to be facility based and has not addressed the issue of coordinating care and the need for a patient centred service. Chronic disease management involves, to a large extent, the follow through and coordination of care processes across the lifetime of an illness. The key staff are the primary care physician and the case manager. Ideally, the case manager would be the primary care physician, but time and resources often do not allow this, and most case managers are nurses or social workers. Case management is new to Singapore and many parts of Asia. The American models confuse Asian healthcare providers because they seem to relate to managed care, which is not relevant locally. In Singapore there are now some 70 case managers, and the profession is expected to grow rapidly.

Information technology had not previously been designed to enable "cross talk" between providers. Disease management requires clinical and financial outcomes to be tracked and monitored over time and across care settings. In addition, data collection of specific clinical indicators should be collected and evaluated. A fully integrated electronic medical record system within an integrated care delivery system is the ideal, but very few providers have managed to achieve this. In the public healthcare system a network is being created to enable sharing of medical records. Each hospital has also created simple patient databases containing standard clinical indicators for patients covered by the disease management programmes.

Finally, at the health policy level, the current funding mechanism in Singapore, based on episodes of care, does not provide incentives for public healthcare providers to go that extra mile to ensure that patient care is effectively and efficiently organised and coordinated across the whole range of services. Moreover, prevention and health promotion activities in hospitals are not funded by the Ministry of Health. More resources need to be dedicated to planning, coordinating, and monitoring the care given after patients have been discharged into the community. The ministry has recently recognised this and established a separate grant for disease management programmes.

## Conclusion

As healthcare policymakers and providers continue to emphasise the importance of care across the whole range of services, clinicians, case managers, and administrators must work together to improve the quality of care, reduce costs, and improve the efficiency of services. Constructing chronic disease management programmes offers doctors an opportunity to take a leading role in re-engineering health care. In the Asian context, chronic disease management programmes focusing on outcomes management, patient empowerment and self monitoring, case management, and streamlining of care processes could work well within a non-managed care environment. Case managers, in particular, are critical to the success of such programmes as they bridge the gap between hospital based and community based care and ensure continuity of care.

There is at present a paucity of evaluations of disease management programmes. Asian countries can, however, learn from the experiences of Singapore

in implementing disease management programmes, which focus on ambulatory primary care and case management rather than on expensive technology driven tools, often seen in other developed countries.

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## Corrections and clarifications

### *Linking guideline to regular feedback to increase appropriate requests for clinical tests: blood gas analysis in intensive care*

Several errors unfortunately crept into this quality improvement report by Paolo Merlani and colleagues (15 September, 620-4). They all appeared on page 623. In figure 4 the y axis should be labelled from 40 to 100 [not 3-9]. The text for the last two footnote symbols beneath the table should be reversed. An electronic glitch led to some standard deviation values in parentheses appearing as superscript numbers: in the second paragraph under the heading "Impact of the intervention" the mean (SD) values should be 20 (4), 24 (2), 22 (2). Our apologies to the authors.

### *Using cardiovascular risk profiles to individualise hypertensive treatment*

Two minus signs were missing and a number was wrong in table 1 of this review article by Michael Pignone and Cynthia D Mulrow (12 May, pp 1164-6). The percentage change in relative risk for death associated with antihypertensive drugs should read -10 (-5 to -20).

### *Complexity and clinical care*

One author's name was omitted from this second article in the "Complexity science" series (22 September, p 685-8). Trisha Greenhalgh, who is also a series editor, should have been named as an author.